Key Elements of Successful Lake Management: Use of the Three-Legged Stool to Manage Lakes

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The 3-legged stool of management

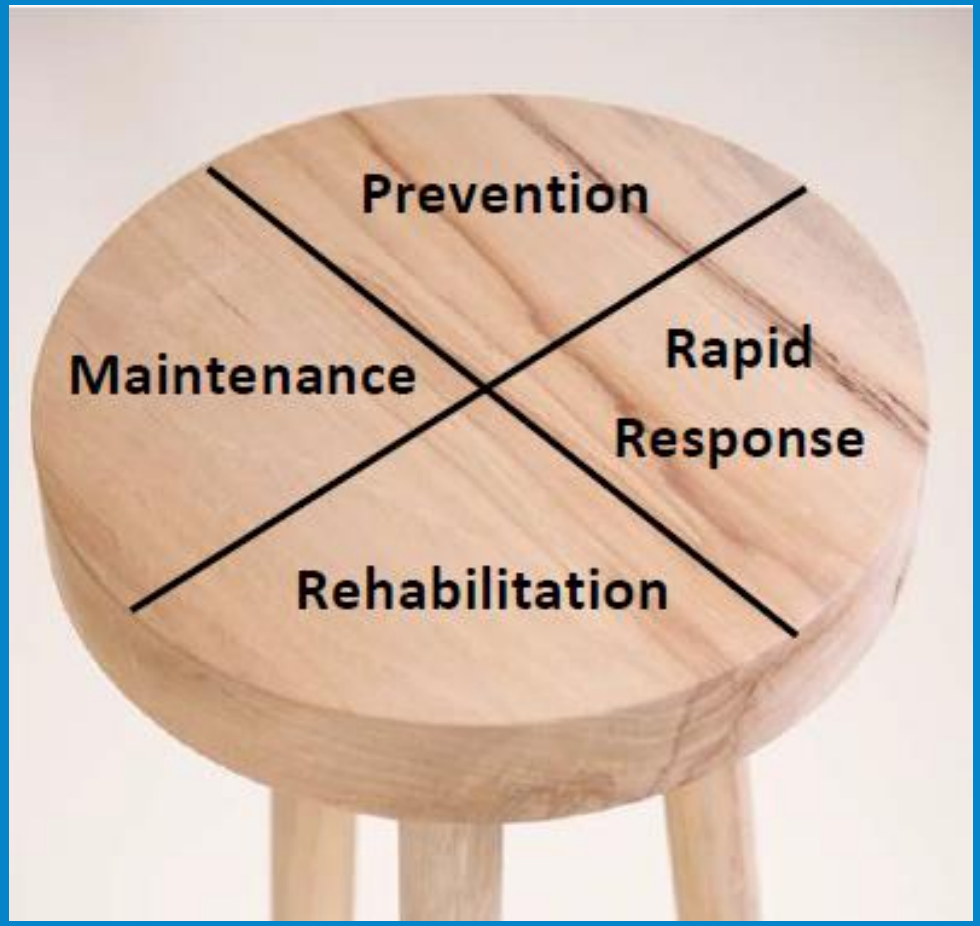
The Legs

- Technical effectiveness
  - Will it work?
  - Non-target impacts?
- Affordability
  - Cost?
  - Financing?
- Institutional acceptability
  - User acceptance?
  - Regulatory acceptance?

The 3-legged stool of management

The Seat

- Prevention
- Early detection/ Rapid response
- Rehabilitation
- Maintenance



“Stress” by Lake Management Options

Some management options put a lot more stress on the stool than others, and some stress one leg more than the others.

- Boat inspection
- Hand pulling
- Benthic barriers
- Herbicides
- Dredging

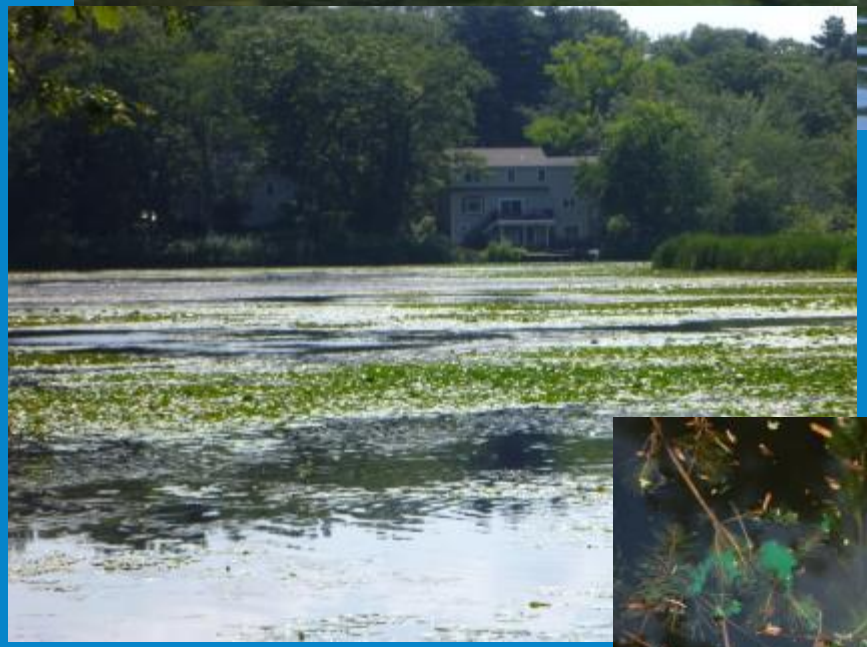
Management Example 1

Morses Pond

105 acre impoundment with 5300 acre urban watershed

Adjacent town wells, town beach, boating

Algae and rooted plant issues



Management Example 1

Morses Pond

Plan in 1993 from consultant to DPW not substantively acted upon

Plan in 2005 from committee of all relevant town departments with multiple public hearings led to success

Management Example 2

Woodridge Lake

380 acres, 8 m max depth

Invasive plant problems

Association did not act on warning of milfoil invasion in 1995

Whole lake herbicide treatment in 2004, resumed deep drawdown

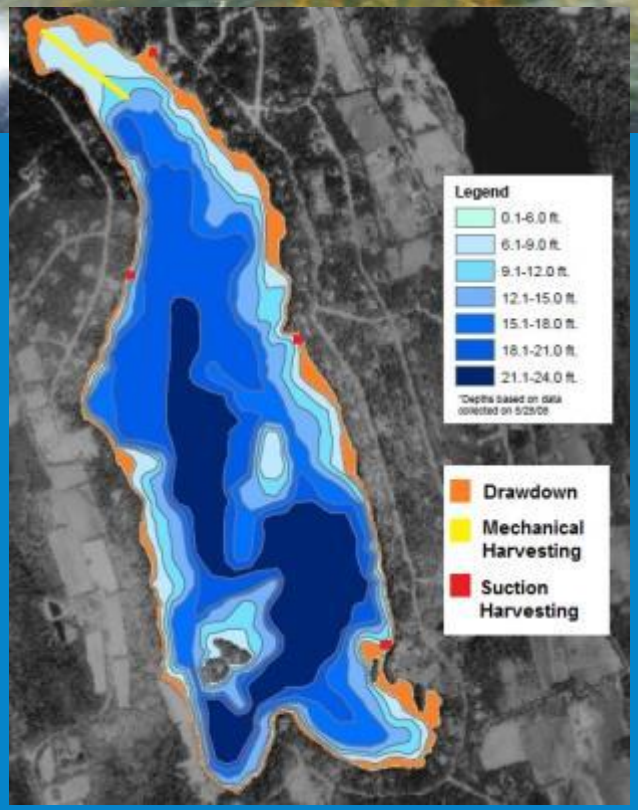
Management Example 2

Woodridge Lake

Faction within Association threatens suit if herbicides used again

Faction demands cessation of drawdown after one spring with very slow refill

Trying to manage invasive plants with harvesting, but unable to keep up



Management Example 3

Laurel Lake

165 acres, 16 m max depth, Great Pond of MA

Infested with zebra mussels about 2007, detected in 2009

Rapid assessment of distribution; only in LL

Panel formed to discuss management options

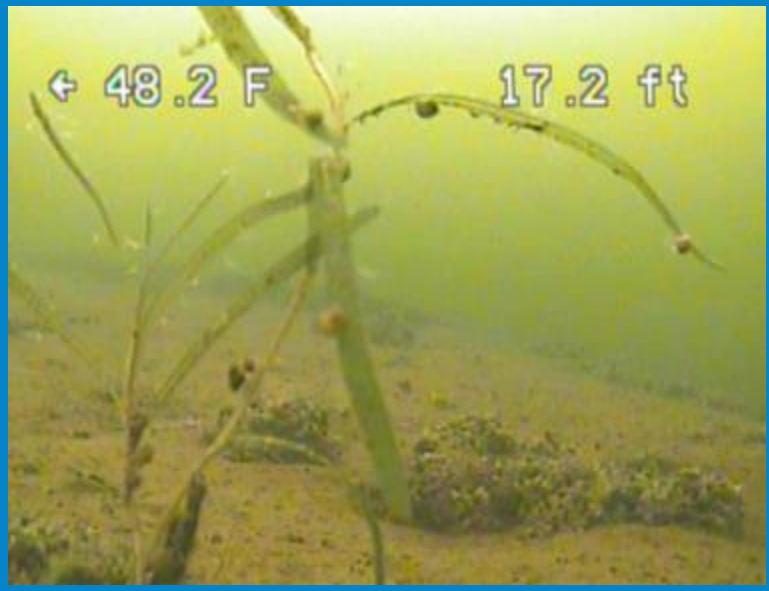
Management Example 3

Laurel Lake

No technique is 100% effective

All techniques have non-target impacts

Panel recommends no management actions, missing opportunity to contain problem and pursue eradication



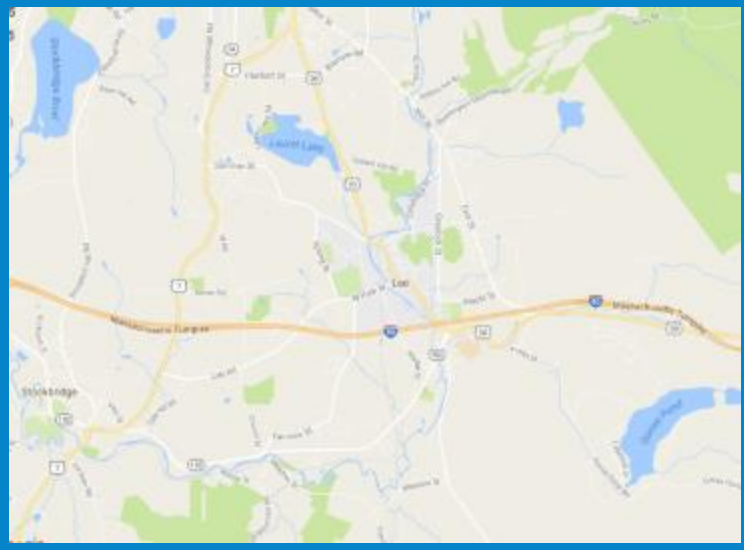
Management Example 3

Laurel Lake

Zebra mussels expand into Housatonic River and into 2 reservoirs in CT

LLPA seeks drawdown for control in nearshore area

One Conservation Commission resists expanded control, state agencies take no action



Balancing on the stool

When contemplating a lake management program, classify it among the 4 approaches and consider the implications for each of the 3 supporting “legs”

Be sure that each leg has been secured

Look for consensus before initiating funding and permitting processes

Support monitoring and adaptive management to keep those legs in place

Drawdown for Lake Management

Desired effects of drawdown:

- Creates flood storage capacity
- Reduces susceptible vegetation
- Protects shoreline and structures from ice damage
- Encourages coarse peripheral sediment
- Concentrates baitfish, panfish and predators

The Science of Drawdown

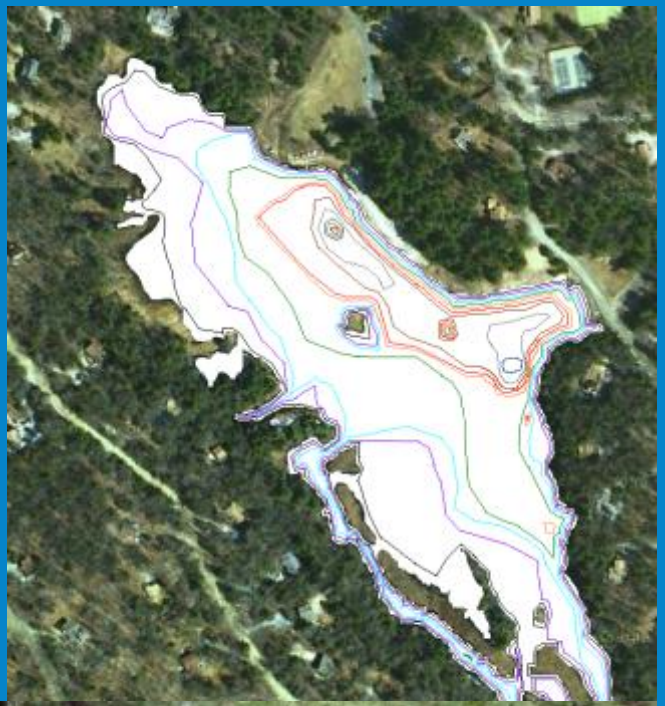
Weather dependent technique – will have range of responses, requires active management for best results

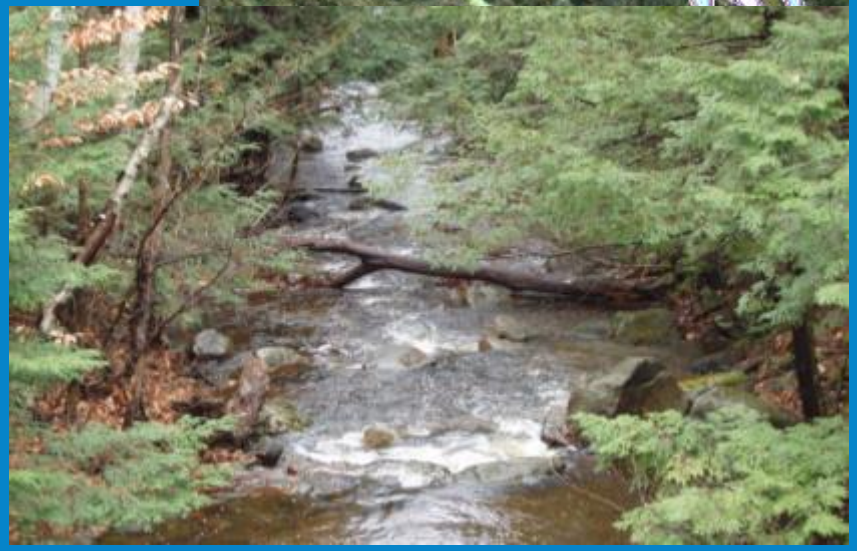
For susceptible species, achieving desirable drawdown conditions every other year is sufficient…but hard to predict good vs bad years

The Science of Drawdown

Key features of lake:

- Lake morphometry
- Inflow rates
- Outflow rates and control





The Science of Drawdown

How far to draw down?

Highly site specific answer, depends on reason for drawdown

Most common considerations include needed flood capacity, plant distribution, other sensitive species, water level control capacity

3 feet considered within range of natural variability, but one-size fits all approach not justifiable

The Science of Drawdown

Timing issues:

- When to start drawdown
- When to reach target depth
- When to terminate drawdown
- When to reach full status

The Science of Drawdown

Rate issues:

- **How fast to draw down**
- **Downstream flood avoidance**
- **How fast to refill**
- **Maintenance of downstream flows**

The Science of Drawdown

Primary environmental issues:

- **Exposure of drawdown zone**
- **Nearby shallow wells**
- **Slow spring refill**
- **Downstream hydrology**

Due to variability, multiple years of monitoring are needed to understand effects of drawdown

The Economics of Drawdown

If an adequate outlet structure exists, drawdown is the least expensive way to control susceptible plants

Failure to provide flood control can result in major economic loss

The Institutions of Drawdown

Organizations:

- **Owners (usually one or more from below)**
- **Lake association or district**
- **Town departments or committees**
- **Other user groups (boaters, fishermen, birdwatchers, ice skaters, abutters, etc.)**
- **State agencies (DCR, DFW, DEP, NHESP)**
- **Federal agencies (USEPA, USACE)**

The Institutions of Drawdown

Permits:

- **Wetlands Protection Act (Town CC/DEP)**
- **Chapter 91 for Great Ponds (DEP)**
- **MA Endangered Species Act (NHESP)**

Lake Management Considerations

- Half the area and two thirds the volume of lakes in MA (not counting Quabbin or Wachusett) created by dams
- The presence of an impoundment (lake) changes hydrology; so does development and agriculture
- A useful analogy for managing lakes is property management (buildings, landscape, related systems); “natural” is an inappropriate concept for most lakes in MA

The Need for Planning Groups

- Clearly state goals and priorities
- Clearly list threats
- Include all parties with an interest
- Balance needs and desires
- Consider all options
- Consider maximum benefit
- Avoid piecemeal evaluation

Questions and Comments